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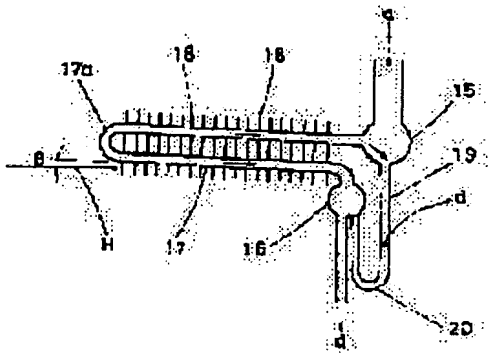
(54) AIR COOLED ABSORBER

(57)Abstract:
PROBLEM TO BE SOLVED: To obtain positive discharging of condensate in a heat transfer tube even in the case a unit incorporating an air cooled condenser is installed slantwise.
SOLUTION: In an air cooled condenser comprising an inlet header 15 and an outlet header 16 connected to both ends of a heat transfer tube 17 comprising a hair pin shaped heat transfer tube 17 and a heat transfer fin 18 formed on the outer periphery of the heat transfer tube 17, a part from an U tube part 17a in the heat transfer tube 17 to a part extending to the outlet header 16 is slanted downward at a specified slanting angle θ, the inlet header 15 and the outlet header 16 are connected by means of a communicating tube 19, so that positive discharging of condensate d is obtained even in the case a unit incorporating an air cooled condenser is arranged slantwise.



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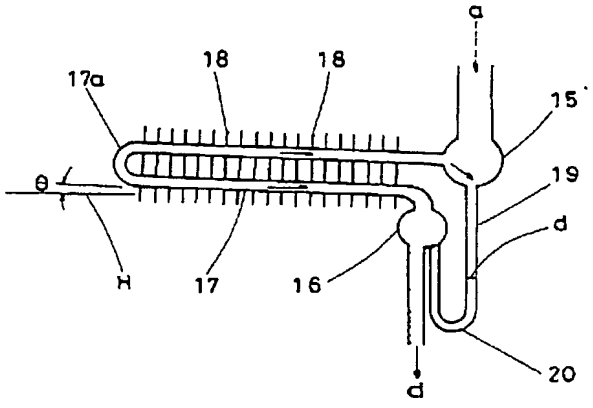
最終頁に続く

(54)【発明の名称】　空冷凝縮器

(57)【要約】

【課題】　空冷凝縮器が組み込まれたユニットが傾斜設置されたとしても、伝熱管における凝縮液の排出が確実に得られるようにする。

【解決手段】　ヘアピン形状の伝熱管１７と、該伝熱管１７の外周に形成された伝熱フィン１８とからなり、前記伝熱管１７の両端に入口および出口ヘッダ１５，１６を接続してなる空冷凝縮器において、前記伝熱管１７におけるＵ管部１７ａから前記出口ヘッダ１６に至る部分を所定の傾斜角θで下方に傾斜させるとともに、前記入口ヘッダ１５と出口ヘッダ１６とを連通管１９を介して接続して、空冷凝縮器が組み込まれたユニットが傾斜設置された場合であっても、凝縮液ｄの排出が確実に得られるようにしている。



1

【特許請求の範囲】

【請求項１】　ヘアピン形状の伝熱管（１７）と、該伝熱管（１７）の外周に形成された伝熱フィン（１８）とからなり、前記伝熱管（１７）の両端に入口および出口ヘッダ（１５），（１６）を接続してなる空冷凝縮器であって、前記伝熱管（１７）におけるＵ管部（１７ａ）から前記出口ヘッダ（１６）に至る部分を所定の傾斜角（θ）で下方に傾斜させるとともに、前記入口ヘッダ（１５）と出口ヘッダ（１６）とを連通管（１９）を介して接続したことを特徴とする空冷凝縮器。

【請求項２】　前記連通管（１９）には、前記出口ヘッダ（１６）より下位に位置する液溜め部（２０）を形成したことを特徴とする前記請求項１記載の空冷凝縮器。

【請求項３】　空冷吸収式冷凍機における冷媒凝縮用として用いることを特徴とする前記請求項１および請求項２のいずれか一項記載の空冷凝縮器。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本願発明は、空冷凝縮器に関し、さらに詳しくは空冷吸収式冷凍機における冷媒凝縮用として適した空冷凝縮器に関するものである。

【０００２】

【従来の技術】例えば、従来からよく知られている空冷吸収式冷凍機は、図４に示すように、ケーシング１内に、高温再生器２、気液分離器３、低温再生器４、空冷凝縮器５、蒸発器６、空冷吸収器７、熱回収用溶液熱交換器８，９、レシーバ１０等をコンパクトに配設して構成されている。符号１１はプロペラファン、１２は溶液ポンプ、１３は冷媒ポンプ、１４は空冷凝縮器５の入口ヘッダ、１５は空冷凝縮器５の出口ヘッダ、１６は空冷吸収器７の出口ヘッダである。

【０００３】上記構成の空冷吸収式冷凍機の場合、空冷凝縮器５を水平配置とするとともに、空冷吸収器７を垂直配置として、プロペラファン１１により空冷凝縮器５および空冷吸収器７の両方を冷却し得るようになっている。

【０００４】ところで、上記空冷凝縮器５は、図５に示すように、ヘアピン形状の伝熱管１７と、該伝熱管１７の外周に形成された伝熱フィン１８とからなっており、前記伝熱管１７の両端に入口および出口ヘッダ１５，１６が接続されている。

【０００５】

【発明が解決しようとする課題】ところで、上記構成の空冷凝縮器５を水平配置した場合、実際には空冷吸収式冷凍機の設置時に空冷吸収式冷凍機自体を水平に設置することが難しいところから、空冷凝縮器５における伝熱管１７が、図５および図６に示すように、水平基準面Ｈに対して傾斜してしまうことがある。

【０００６】例えば、空冷凝縮器５においては冷媒蒸気ａが凝縮して凝縮液ｄとなるが、図５に示すように、伝

2

熱管１７におけるＵ管部１７ａが下向きとなるように傾斜した場合、凝縮液ｄの出口ヘッダ１６側への排出が困難になってＵ管部１７ａの近くに凝縮液ｄが滞留することとなる。一方、図６に示すように、伝熱管１７におけるＵ管部１７ａが上向きとなるように傾斜した場合、凝縮液ｄの出口ヘッダ１６側への排出が困難になって入口ヘッダ１５に凝縮液ｄが滞留することとなる。特に、吸収式冷凍機のように圧力差が大きくない場合にはこの現象が顕著となる。　上記のような凝縮液ｄの滞留現象が生じると、圧力損失が増大したり、伝熱性能が低下して、凝縮圧力の増大を招くという問題が生ずる。その結果、効率が低下したり、高温再生器２の温度が高くなって腐食の危険度が高くなり、安全のために運転停止に至ることがある。また、空冷吸収式冷凍機の設置条件が厳しくなり、施工に手間がかかるという問題もある。

【０００７】本願発明は、上記の点に鑑みてなされたもので、空冷凝縮器が組み込まれたユニットが傾斜設置されたとしても、伝熱管における凝縮液の排出が確実に得られるようにすることを目的とするものである。

【０００８】

【課題を解決するための手段】本願発明の基本構成（請求項１の発明）では、上記課題を解決するための手段として、ヘアピン形状の伝熱管１７と、該伝熱管１７の外周に形成された伝熱フィン１８とからなり、前記伝熱管１７の両端に入口および出口ヘッダ１５，１６を接続してなる空冷凝縮器において、前記伝熱管１７におけるＵ管部１７ａから前記出口ヘッダ１６に至る部分を所定の傾斜角θで下方に傾斜させるとともに、前記入口ヘッダ１５と出口ヘッダ１６とを連通管１９を介して接続している。

【０００９】上記のように構成したことにより、空冷凝縮器が組み込まれたユニットが、伝熱管１７におけるＵ管部１７ａが下向きとなるように傾斜設置された場合であっても、Ｕ管部１７ａから前記出口ヘッダ１６に至る部分を予め下向きに傾斜させているため、前記Ｕ管部１７ａが下向きとなることがなくなり、凝縮液ｄの排出が確実に得られる。また、前記ユニットが、伝熱管１７におけるＵ管部１７ａが上向きとなるように傾斜設置された場合には、入口ヘッダ１５に流入した凝縮液ｄが連通管１９を介して出口ヘッダ１６に流出することとなり、凝縮液ｄの排出が確実に得られる。

【００１０】請求項２の発明におけるように、前記連通管１９に、前記出口ヘッダ１６より下位に位置する液溜め部２０を形成した場合、該液溜め部２０に凝縮液ｄが滞留することとなり、入口ヘッダ１５から出口ヘッダ１６への冷媒蒸気ａの吹き抜けを防止することができる。

【００１１】請求項３の発明におけるように、空冷吸収式冷凍機における冷媒凝縮用として用いた場合、高低圧差が小さいため凝縮液ｄの排出が難しいのでより有効である。

3

【００１２】

【発明の実施の形態】以下、添付の図面を参照して、本願発明の好適な実施の形態について詳述する。

【００１３】この空冷凝縮器は、従来技術の項において既に説明したものと同様に、空冷吸収式冷凍機における冷媒凝縮用に供されるものであり、図１に示すように、ヘアピン形状の伝熱管１７と、該伝熱管１７の外周に形成された伝熱フィン１８とからなっている。そして、前記伝熱管１７の両端には、入口および出口ヘッダ１５，１６が接続されている。

【００１４】また、前記伝熱管１７におけるＵ管部１７ａから前記出口ヘッダ１６に至る部分は所定の傾斜角θで下方に傾斜されるとともに、前記入口ヘッダ１５と出口ヘッダ１６とは連通管１９を介して接続されている。ここで、前記傾斜角θは、空冷凝縮器が組み込まれたユニット（例えば、空冷吸収式冷凍機）を設置する時の許容傾斜角と同一程度に設定されるのが望ましく、１／１００程度とされる。

【００１５】また、前記連通管１９には、前記出口ヘッダ１６より下位に位置する液溜め部となるＵ字状部２０が形成されている。

【００１６】上記のように構成された空冷凝縮器は、次のように作用する。

【００１７】入口ヘッダ１５に供給された冷媒蒸気ａは、伝熱管１７内を出口ヘッダ１６に向かって流れる過程で凝縮液化され、得られた凝縮液ｄは、出口ヘッダ１６から取り出される。

【００１８】ところで、空冷凝縮器が組み込まれたユニットが傾斜設置される場合があるが、図２に示すように、伝熱管１７におけるＵ管部１７ａが下向きとなるように設置傾斜角α（αｍａｘ＝θ）で傾斜設置された場合には、Ｕ管部１７ａから前記出口ヘッダ１６に至る部分を予め下向きに傾斜角θで傾斜させているため、前記Ｕ管部１７ａが水平基準面Ｈより下向きとなることがなくなり、凝縮液ｄの排出が確実に得られる。しかも、Ｕ字状部２０に凝縮液ｄが滞留するため、入口ヘッダ１５から出口ヘッダ１６への冷媒蒸気ａの吹き抜けを防止することができる。なお、液溜め部に代えて、オリフィスあるいはキャピラリチューブを介設してもよい。

【００１９】また、前記ユニットが、伝熱管１７におけるＵ管部１７ａが上向きとなるように傾斜角βで傾斜設置された場合には、入口ヘッダ１５に流入した凝縮液ｄが連通管１９を介して出口ヘッダ１６に流出することとなり、凝縮液ｄの排出が確実に得られる。しかも、Ｕ字状部２０に凝縮液ｄが滞留するため、入口ヘッダ１５から出口ヘッダ１６への冷媒蒸気ａの吹き抜けを防止することができる。

【００２０】特に、本実施の形態におけるように、空冷凝縮器を空冷吸収式冷凍機における冷媒凝縮用として用いた場合、高低圧差が小さいため凝縮液ｄの排出が難しいのでより有効である。

4

【００２１】なお、本願発明は、空冷吸収式冷凍機における空冷凝縮器だけでなく、高低圧差の比較的小さい冷凍機における空冷凝縮器にも適用可能なことは勿論である。

【００２２】

【発明の効果】本願発明（請求項１の発明）によれば、ヘアピン形状の伝熱管１７と、該伝熱管１７の外周に形成された伝熱フィン１８とからなり、前記伝熱管１７の両端に入口および出口ヘッダ１５，１６を接続してなる空冷凝縮器において、前記伝熱管１７におけるＵ管部１７ａから前記出口ヘッダ１６に至る部分を所定の傾斜角θで下方に傾斜させるとともに、前記入口ヘッダ１５と出口ヘッダ１６とを連通管１９を介して接続しているので、空冷凝縮器が組み込まれたユニットが、伝熱管１７におけるＵ管部１７ａが下向きとなるように傾斜設置された場合であっても、Ｕ管部１７ａから前記出口ヘッダ１６に至る部分を予め下向きに傾斜させているため、前記Ｕ管部１７ａが下向きとなることがなくなり、凝縮液ｄの排出が確実に得られるし、前記ユニットが、伝熱管１７におけるＵ管部１７ａが上向きとなるように傾斜設置された場合には、入口ヘッダ１５に流入した凝縮液ｄが連通管１９を介して出口ヘッダ１６に流出することとなり、凝縮液ｄの排出が確実に得られるという優れた効果がある。また、前記ユニットが傾斜設置されても問題が生じないので、ユニットの設置条件を緩和できるし、ユニットへの空冷凝縮器の取付角度の許容度が大きくなり、組付作業性が向上する。

【００２３】請求項２の発明におけるように、前記連通管１９に、前記出口ヘッダ１６より下位に位置する液溜め部２０を形成した場合、該液溜め部２０に凝縮液ｄが滞留することとなり、入口ヘッダ１５から出口ヘッダ１６への冷媒蒸気ａの吹き抜けを防止することができる。

【００２４】請求項３の発明におけるように、空冷吸収式冷凍機における冷媒凝縮用として用いた場合、高低圧差が小さいため凝縮液ｄの排出が難しいのでより有効である。

【図面の簡単な説明】

【図１】本願発明の実施の形態にかかる空冷凝縮器の断面図である。

【図２】本願発明の実施の形態にかかる空冷凝縮器の傾斜設置時（伝熱管が水平となるような設置時）における状態を示す断面図である。

【図３】本願発明の実施の形態にかかる空冷凝縮器の傾斜設置時（伝熱管Ｕ管部が上向きとなるような設置時）における状態を示す断面図である。

【図４】一般の空冷吸収式冷凍機の内部を透視した斜視図である。

【図５】従来の空冷凝縮器の傾斜設置時（伝熱管Ｕ管部が下向きとなるような設置時）における状態を示す断面

5

図である。

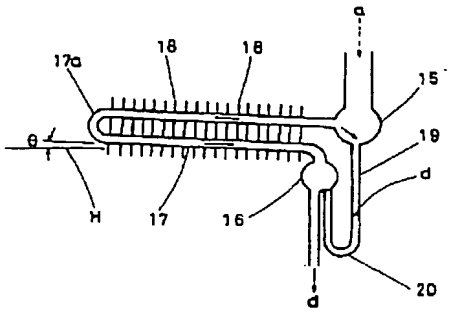
【図６】従来の空冷凝縮器の傾斜設置時（伝熱管Ｕ管部が上向きとなるような設置時）における状態を示す断面図である。

6

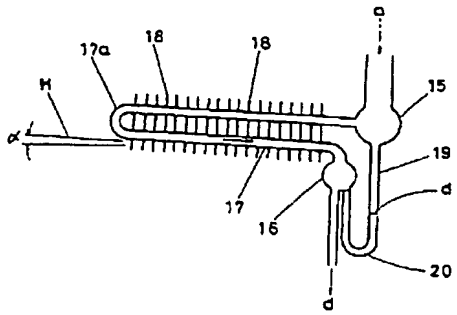
【符号の説明】

１５は入口ヘッダ、１６は出口ヘッダ、１７は伝熱管、１７ａはＵ管部、１８は伝熱フィン、１９は連通管、２０は液溜め部（Ｕ字状部）、θは傾斜角。

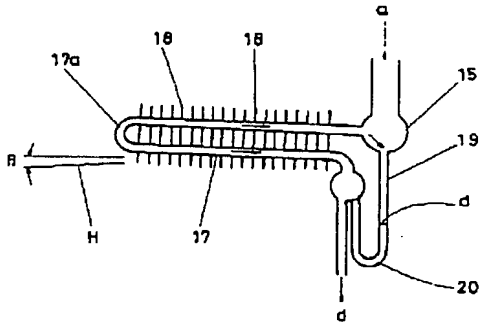
【図１】



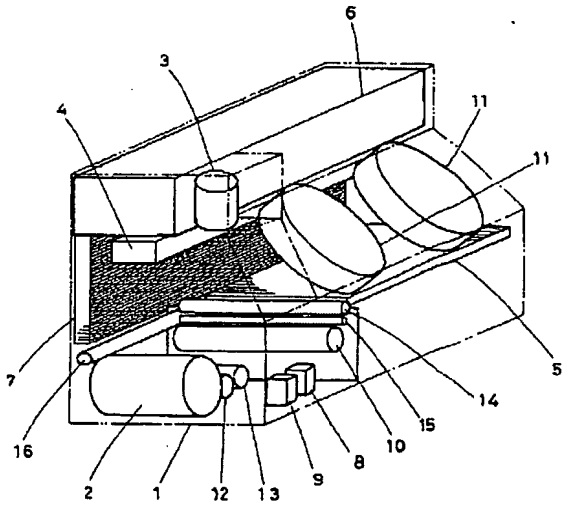
【図２】



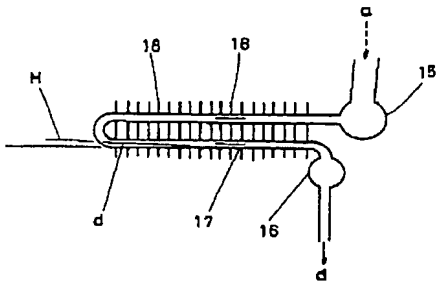
【図３】



【図４】



【図５】



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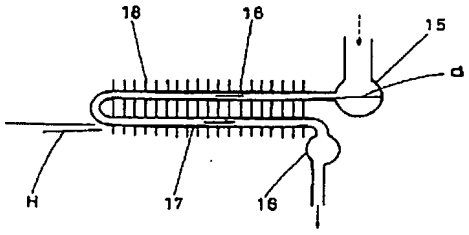

フロントページの続き

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CLAIMS

[Claim(s)]
[Claim 1] It consists of a heat transfer fin (18) formed in the periphery of the heat exhanger tube (17) of a hairpin configuration, and this heat exhanger tube (17). It is the air-cooled condenser which comes to connect an inlet port and an outlet header (15), and (16) with the ends of said heat exhanger tube (17). The air-cooled condenser characterized by connecting said inlet-port header (15) and outlet header (16) through the communicating tube (19) while making the part from U tube part (17a) in said heat exhanger tube (17) to said outlet header (16) incline caudad with a predetermined tilt angle (theta).
[Claim 2] Said air-cooled condenser according to claim 1 characterized by forming in said communicating tube (19) the liquid pool section (20) located in low order from said outlet header (16).
[Claim 3] The air-cooled condenser of said claim 1 characterized by using as an object for refrigerant condensation in an air-cooling absorption refrigerator, and claim 2 given in any 1 term.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] The invention in this application relates to the air-cooled condenser for which it was suitable as an object for refrigerant condensation in an air-cooling absorption refrigerator in more detail about an air-cooled condenser.
[0002]
[Description of the Prior Art] For example, in casing 1, a high temperature regenerator 2, the vapor-liquid-separation machine 3, a low-temperature regenerator 4, an air-cooled condenser 5, an evaporator 6, the air-cooling absorber 7, the solution heat exchangers 8 and 9 for heat recovery, and receiver 10 grade are arranged in a compact, and the air-cooling absorption refrigerator well known from the former is constituted, as shown in drawing 4 . For a solution pump and 13, as for the inlet-port header of an air-cooled condenser 5, and 15, a refrigerant pump and 14 are [a sign 11 / a propeller fan and 12 / the outlet header of an air-cooled condenser 5 and 16] the outlet headers of the air-cooling absorber 7.
[0003] While considering an air-cooled condenser 5 as level arrangement in the case of the air-cooling absorption refrigerator of the above-mentioned configuration, both an air-cooled condenser 5 and the air-cooling absorber 7 can be cooled with a propeller fan 11 by making the air-cooling absorber 7 into vertical disposition.
[0004] By the way, as the above-mentioned air-cooled condenser 5 is shown in drawing 5 , it consists of a heat exhanger tube 17 of a hairpin configuration, and a heat transfer fin 18 formed in the periphery of this heat exhanger tube 17, and an inlet port and the outlet headers 15 and 16 are connected to the ends of said heat exhanger tube 17.
[0005]
[Problem(s) to be Solved by the Invention] By the way, from the place where it is actually difficult at the time of installation of an air-cooling absorption refrigerator to install the air-cooling absorption refrigerator itself horizontally, when level arrangement of the air-cooled condenser 5 of the above-mentioned configuration is carried out, the heat exhanger tube 17 in an air-cooled condenser 5 may incline to the level datum level H, as shown in drawing 5 and drawing 6 .
[0006] For example, although the refrigerant steam a condenses in an air-cooled condenser 5 and it becomes Condensate d, when it inclines so that U tube part 17a in a heat exhanger tube 17 may become facing down as shown in drawing 5 , the blowdown by the side of the outlet header 16 of Condensate d becomes difficult, and Condensate d will pile up near the U tube part 17a. On the other hand, when it inclines so that U tube part 17a in a heat exhanger tube 17 may become facing up as shown in drawing 6 , the blowdown by the side of the outlet header 16 of Condensate d becomes difficult, and Condensate d will pile up in the inlet-port header 15. Especially, like an absorption refrigerator, when a pressure differential is not large, this phenomenon becomes remarkable. If the stagnation phenomenon of the above condensates d arises, pressure loss will increase, or the heat transfer engine performance will fall, and the problem of causing buildup of condensing pressure will arise. Consequently, effectiveness may fall, or the temperature of a high temperature regenerator 2 may become high, the danger of

corrosion may become high, and it may result in shutdown for insurance. Moreover, the installation conditions of an air-cooling absorption refrigerator become severe, and there is also a problem that construction takes time and effort.

[0007] The invention in this application was made in view of the above-mentioned point, and even if dip installation of the unit with which the air-cooled condenser was incorporated is carried out, it aims at blowdown of the condensate in a heat exhanger tube being acquired certainly.

[0008]

[Means for Solving the Problem] With the basic configuration (invention of claim 1) of the invention in this application As above-mentioned The means for solving a technical problem, the heat exhanger tube 17 of a hairpin configuration, In the air-cooled condenser which consists of a heat transfer fin 18 formed in the periphery of this heat exhanger tube 17, and comes to connect an inlet port and the outlet headers 15 and 16 with the ends of said heat exhanger tube 17 While making the part from U tube part 17a in said heat exhanger tube 17 to said outlet header 16 incline caudad with the predetermined tilt angle theta, said inlet-port header 15 and outlet header 16 are connected through the communicating tube 19.

[0009] Since the part from U tube part 17a to said outlet header 16 is made to incline downward beforehand even if it is the case where dip installation is carried out so that U tube part 17a [in / in the unit with which the air-cooled condenser was incorporated by having constituted as mentioned above / a heat exhanger tube 17] may become facing down, it is lost that said U tube part 17a becomes facing down, and blowdown of Condensate d is acquired certainly. Moreover, when dip installation is carried out so that U tube part 17a [in / in said unit / a heat exhanger tube 17] may become facing up, the condensate d which flowed into the inlet-port header 15 will flow into the outlet header 16 through the communicating tube 19, and blowdown of Condensate d is acquired certainly.

[0010] When the liquid pool section [as / in invention of claim 2] 20 located in low order from said outlet header 16 at said communicating tube 19 is formed, Condensate d will pile up in this liquid pool section 20, and the blow by of the refrigerant steam a from the inlet-port header 15 to the outlet header 16 can be prevented.

[0011] When it uses as an object [as / in invention of claim 3] for refrigerant condensation in an air-cooling absorption refrigerator, since the height pressure deficit is small and blowdown of Condensate d is difficult, it is more effective.

[0012]

[Embodiment of the Invention] Hereafter, with reference to an attached drawing, the gestalt of suitable operation of the invention in this application is explained in full detail.

[0013] Like what was already explained in the term of the conventional technique, the refrigerant condensation in an air-cooling absorption refrigerator is presented with this air-cooled condenser, and as shown in drawing 1 , it consists of a heat exhanger tube 17 of a hairpin configuration, and a heat transfer fin 18 formed in the periphery of this heat exhanger tube 17. And an inlet port and the outlet headers 15 and 16 are connected to the ends of said heat exhanger tube 17.

[0014] Moreover, while the part from U tube part 17a in said heat exhanger tube 17 to said outlet header 16 inclines caudad with the predetermined tilt angle theta, said inlet-port header 15 and outlet header 16 are connected through the communicating tube 19. Here, it is desirable to be set as extent as the allowance tilt angle when installing the unit (for example, air-cooling absorption refrigerator) with which the air-cooled condenser was incorporated with said same tilt angle theta, and it is made about into 1/100.

[0015] Moreover, the U character-like section 20 which turns into the liquid pool section located in low order from said outlet header 16 is formed in said communicating tube 19.

[0016] The air-cooled condenser constituted as mentioned above acts as follows.

[0017] The condensation liquefaction of the refrigerant steam a supplied to the inlet-port header 15 is carried out in the process in which the inside of a heat exhanger tube 17 is flowed toward the outlet header 16, and the obtained condensate d is taken out from the outlet header 16.

[0018] By the way, although dip installation of the unit with which the air-cooled condenser was

incorporated may be carried out When dip installation is carried out with the installation tilt angle alpha (alpha max=theta) so that U tube part 17a in a heat exhanger tube 17 may become facing down as shown in drawing 2 Since the part from U tube part 17a to said outlet header 16 is made to incline with the tilt angle theta downward beforehand, it is lost that said U tube part 17a becomes facing down from the level datum level H, and blowdown of Condensate d is acquired certainly. And since Condensate d piles up in the U character-like section 20, the blow by of the refrigerant steam a from the inlet-port header 15 to the outlet header 16 can be prevented. In addition, it may replace with the liquid pool section and an orifice or a capillary tube may be interposed.

[0019] Moreover, when dip installation is carried out with the tilt angle beta so that U tube part 17a [in / in said unit / a heat exhanger tube 17] may become facing up, the condensate d which flowed into the inlet-port header 15 will flow into the outlet header 16 through the communicating tube 19, and blowdown of Condensate d is acquired certainly. And since Condensate d piles up in the U character-like section 20, the blow by of the refrigerant steam a from the inlet-port header 15 to the outlet header 16 can be prevented.

[0020] When it uses especially as an object [as / in the gestalt of this operation / in / for an air-cooled condenser / an air-cooling absorption refrigerator] for refrigerant condensation, since the height pressure deficit is small and blowdown of Condensate d is difficult, it is more effective.

[0021] In addition, the invention in this application of the ability to apply not only to the air-cooled condenser in an air-cooling absorption refrigerator but to the air-cooled condenser in the comparatively small refrigerator of a height pressure deficit is natural.

[0022]

[Effect of the Invention] According to the invention in this application (invention of claim 1), the heat exhanger tube 17 of a hairpin configuration, In the air-cooled condenser which consists of a heat transfer fin 18 formed in the periphery of this heat exhanger tube 17, and comes to connect an inlet port and the outlet headers 15 and 16 with the ends of said heat exhanger tube 17 While making the part from U tube part 17a in said heat exhanger tube 17 to said outlet header 16 incline caudad with the predetermined tilt angle theta Since said inlet-port header 15 and outlet header 16 are connected through the communicating tube 19 Since the part from U tube part 17a to said outlet header 16 is made to incline downward beforehand even if it is the case where dip installation is carried out so that U tube part 17a [in / in the unit with which the air-cooled condenser was incorporated / a heat exhanger tube 17] may become facing down, It is lost that said U tube part 17a becomes facing down, and blowdown of Condensate d is acquired certainly, and When dip installation is carried out so that U tube part 17a [in / in said unit / a heat exhanger tube 17] may become facing up, the condensate d which flowed into the inlet-port header 15 will flow into the outlet header 16 through the communicating tube 19, and there is outstanding effectiveness that blowdown of Condensate d is acquired certainly. Moreover, since a problem does not arise even if dip installation of said unit is carried out, the installation conditions of a unit can be eased, the tolerance of the mounting angle of the air-cooled condenser to a unit becomes large, and workability with a group improves.

[0023] When the liquid pool section [as / in invention of claim 2] 20 located in low order from said outlet header 16 at said communicating tube 19 is formed, Condensate d will pile up in this liquid pool section 20, and the blow by of the refrigerant steam a from the inlet-port header 15 to the outlet header 16 can be prevented.

[0024] When it uses as an object [as / in invention of claim 3] for refrigerant condensation in an air-cooling absorption refrigerator, since the height pressure deficit is small and blowdown of Condensate d is difficult, it is more effective.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] The invention in this application relates to the air-cooled condenser for which it was suitable as an object for refrigerant condensation in an air-cooling absorption refrigerator in more detail about an air-cooled condenser.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] For example, in casing 1, a high temperature regenerator 2, the vapor-liquid-separation machine 3, a low-temperature regenerator 4, an air-cooled condenser 5, an evaporator 6, the air-cooling absorber 7, the solution heat exchangers 8 and 9 for heat recovery, and receiver 10 grade are arranged in a compact, and the air-cooling absorption refrigerator well known from the former is constituted, as shown in drawing 4 . For a solution pump and 13, as for the inlet-port header of an air-cooled condenser 5, and 15, a refrigerant pump and 14 are [a sign 11 / a propeller fan and 12 / the outlet header of an air-cooled condenser 5 and 16] the outlet headers of the air-cooling absorber 7.
[0003] While considering an air-cooled condenser 5 as level arrangement in the case of the air-cooling absorption refrigerator of the above-mentioned configuration, both an air-cooled condenser 5 and the air-cooling absorber 7 can be cooled with a propeller fan 11 by making the air-cooling absorber 7 into vertical disposition.
[0004] By the way, as the above-mentioned air-cooled condenser 5 is shown in drawing 5 , it consists of a heat exhanger tube 17 of a hairpin configuration, and a heat transfer fin 18 formed in the periphery of this heat exhanger tube 17, and an inlet port and the outlet headers 15 and 16 are connected to the ends of said heat exhanger tube 17.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] According to the invention in this application (invention of claim 1), the heat exhanger tube 17 of a hairpin configuration, In the air-cooled condenser which consists of a heat transfer fin 18 formed in the periphery of this heat exhanger tube 17, and comes to connect an inlet port and the outlet headers 15 and 16 with the ends of said heat exhanger tube 17 While making the part from U tube part 17a in said heat exhanger tube 17 to said outlet header 16 incline caudad with the predetermined tilt angle theta Since said inlet-port header 15 and outlet header 16 are connected through the communicating tube 19 Since the part from U tube part 17a to said outlet header 16 is made to incline downward beforehand even if it is the case where dip installation is carried out so that U tube part 17a [in / in the unit with which the air-cooled condenser was incorporated / a heat exhanger tube 17] may become facing down, It is lost that said U tube part 17a becomes facing down, and blowdown of Condensate d is acquired certainly, and When dip installation is carried out so that U tube part 17a [in / in said unit / a heat exhanger tube 17] may become facing up, the condensate d which flowed into the inlet-port header 15 will flow into the outlet header 16 through the communicating tube 19, and there is outstanding effectiveness that blowdown of Condensate d is acquired certainly. Moreover, since a problem does not arise even if dip installation of said unit is carried out, the installation conditions of a unit can be eased, the tolerance of the mounting angle of the air-cooled condenser to a unit becomes large, and workability with a group improves.
[0023] When the liquid pool section [as / in invention of claim 2] 20 located in low order from said outlet header 16 at said communicating tube 19 is formed, Condensate d will pile up in this liquid pool section 20, and the blow by of the refrigerant steam a from the inlet-port header 15 to the outlet header 16 can be prevented.
[0024] When it uses as an object [as / in invention of claim 3] for refrigerant condensation in an air-cooling absorption refrigerator, since the height pressure deficit is small and blowdown of Condensate d is difficult, it is more effective.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] By the way, from the place where it is actually difficult at the time of installation of an air-cooling absorption refrigerator to install the air-cooling absorption refrigerator itself horizontally, when level arrangement of the air-cooled condenser 5 of the above-mentioned configuration is carried out, the heat exhanger tube 17 in an air-cooled condenser 5 may incline to the level datum level H, as shown in drawing 5 and drawing 6 .

[0006] For example, although the refrigerant steam a condenses in an air-cooled condenser 5 and it becomes Condensate d, when it inclines so that U tube part 17a in a heat exhanger tube 17 may become facing down as shown in drawing 5 , the blowdown by the side of the outlet header 16 of Condensate d becomes difficult, and Condensate d will pile up near the U tube part 17a. On the other hand, when it inclines so that U tube part 17a in a heat exhanger tube 17 may become facing up as shown in drawing 6 , the blowdown by the side of the outlet header 16 of Condensate d becomes difficult, and Condensate d will pile up in the inlet-port header 15. Especially, like an absorption refrigerator, when a pressure differential is not large, this phenomenon becomes remarkable. If the stagnation phenomenon of the above condensates d arises, pressure loss will increase, or the heat transfer engine performance will fall, and the problem of causing buildup of condensing pressure will arise. Consequently, effectiveness may fall, or the temperature of a high temperature regenerator 2 may become high, the danger of corrosion may become high, and it may result in shutdown for insurance. Moreover, the installation conditions of an air-cooling absorption refrigerator become severe, and there is also a problem that construction takes time and effort.

[0007] The invention in this application was made in view of the above-mentioned point, and even if dip installation of the unit with which the air-cooled condenser was incorporated is carried out, it aims at blowdown of the condensate in a heat exhanger tube being acquired certainly.

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MEANS

[Means for Solving the Problem] With the basic configuration (invention of claim 1) of the invention in this application As above-mentioned The means for solving a technical problem, the heat exhanger tube 17 of a hairpin configuration, In the air-cooled condenser which consists of a heat transfer fin 18 formed in the periphery of this heat exhanger tube 17, and comes to connect an inlet port and the outlet headers 15 and 16 with the ends of said heat exhanger tube 17 While making the part from U tube part 17a in said heat exhanger tube 17 to said outlet header 16 incline caudad with the predetermined tilt angle theta, said inlet-port header 15 and outlet header 16 are connected through the communicating tube 19.
[0009] Since the part from U tube part 17a to said outlet header 16 is made to incline downward beforehand even if it is the case where dip installation is carried out so that U tube part 17a [in / in the unit with which the air-cooled condenser was incorporated by having constituted as mentioned above / a heat exhanger tube 17] may become facing down, it is lost that said U tube part 17a becomes facing down, and blowdown of Condensate d is acquired certainly. Moreover, when dip installation is carried out so that U tube part 17a [in / in said unit / a heat exhanger tube 17] may become facing up, the condensate d which flowed into the inlet-port header 15 will flow into the outlet header 16 through the communicating tube 19, and blowdown of Condensate d is acquired certainly.
[0010] When the liquid pool section [as / in invention of claim 2] 20 located in low order from said outlet header 16 at said communicating tube 19 is formed, Condensate d will pile up in this liquid pool section 20, and the blow by of the refrigerant steam a from the inlet-port header 15 to the outlet header 16 can be prevented.
[0011] When it uses as an object [as / in invention of claim 3] for refrigerant condensation in an air-cooling absorption refrigerator, since the height pressure deficit is small and blowdown of Condensate d is difficult, it is more effective.
[0012]
[Embodiment of the Invention] Hereafter, with reference to an attached drawing, the gestalt of suitable operation of the invention in this application is explained in full detail.
[0013] Like what was already explained in the term of the conventional technique, the refrigerant condensation in an air-cooling absorption refrigerator is presented with this air-cooled condenser, and as shown in drawing 1 , it consists of a heat exhanger tube 17 of a hairpin configuration, and a heat transfer fin 18 formed in the periphery of this heat exhanger tube 17. And an inlet port and the outlet headers 15 and 16 are connected to the ends of said heat exhanger tube 17.
[0014] Moreover, while the part from U tube part 17a in said heat exhanger tube 17 to said outlet header 16 inclines caudad with the predetermined tilt angle theta, said inlet-port header 15 and outlet header 16 are connected through the communicating tube 19. Here, it is desirable to be set as extent as the allowance tilt angle when installing the unit (for example, air-cooling absorption refrigerator) with which the air-cooled condenser was incorporated with said same tilt angle theta, and it is made about into 1/100.
[0015] Moreover, the U character-like section 20 which turns into the liquid pool section located in low order from said outlet header 16 is formed in said communicating tube 19.

[0016] The air-cooled condenser constituted as mentioned above acts as follows.
[0017] The condensation liquefaction of the refrigerant steam a supplied to the inlet-port header 15 is carried out in the process in which the inside of a heat exhanger tube 17 is flowed toward the outlet header 16, and the obtained condensate d is taken out from the outlet header 16.
[0018] By the way, although dip installation of the unit with which the air-cooled condenser was incorporated may be carried out When dip installation is carried out with the installation tilt angle alpha (alpha max=theta) so that U tube part 17a in a heat exhanger tube 17 may become facing down as shown in drawing 2 Since the part from U tube part 17a to said outlet header 16 is made to incline with the tilt angle theta downward beforehand, it is lost that said U tube part 17a becomes facing down from the level datum level H, and blowdown of Condensate d is acquired certainly. And since Condensate d piles up in the U character-like section 20, the blow by of the refrigerant steam a from the inlet-port header 15 to the outlet header 16 can be prevented. In addition, it may replace with the liquid pool section and an orifice or a capillary tube may be interposed.
[0019] Moreover, when dip installation is carried out with the tilt angle beta so that U tube part 17a [in / in said unit / a heat exhanger tube 17] may become facing up, the condensate d which flowed into the inlet-port header 15 will flow into the outlet header 16 through the communicating tube 19, and blowdown of Condensate d is acquired certainly. And since Condensate d piles up in the U character-like section 20, the blow by of the refrigerant steam a from the inlet-port header 15 to the outlet header 16 can be prevented.
[0020] When it uses especially as an object [as / in the gestalt of this operation / in / for an air-cooled condenser / an air-cooling absorption refrigerator] for refrigerant condensation, since the height pressure deficit is small and blowdown of Condensate d is difficult, it is more effective.
[0021] In addition, the invention in this application of the ability to apply not only to the air-cooled condenser in an air-cooling absorption refrigerator but to the air-cooled condenser in the comparatively small refrigerator of a height pressure deficit is natural.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the sectional view of the air-cooled condenser concerning the gestalt of operation of the invention in this application.
[Drawing 2] It is the sectional view showing the condition at the time of dip installation of the air-cooled condenser concerning the gestalt of operation of the invention in this application (at the time of installation to which a heat exhanger tube becomes level).
[Drawing 3] It is the sectional view showing the condition at the time of dip installation of the air-cooled condenser concerning the gestalt of operation of the invention in this application (at the time of installation to which a heat exhanger tube U tube part serves as facing up).
[Drawing 4] It is the perspective view which saw through the interior of a general air-cooling absorption refrigerator.
[Drawing 5] It is the sectional view showing the condition at the time of dip installation of the conventional air-cooled condenser (at the time of installation to which a heat exhanger tube U tube part serves as facing down).
[Drawing 6] It is the sectional view showing the condition at the time of dip installation of the conventional air-cooled condenser (at the time of installation to which a heat exhanger tube U tube part serves as facing up).
[Description of Notations]
15 — an inlet-port header and 16 — an outlet header and 17 — a heat exhanger tube and 17a — U tube part and 18 — a heat transfer fin and 19 — the communicating tube and 20 — the liquid pool section (U character-like section) and theta — a tilt angle.

[Translation done.]

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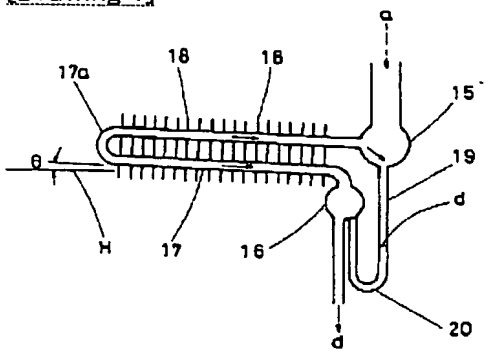
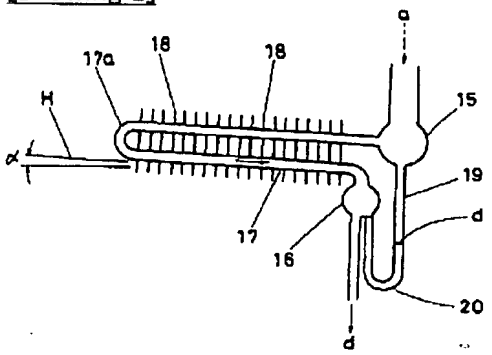
DRAWINGS

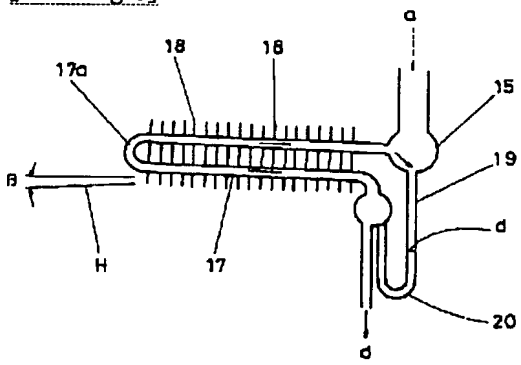
[Drawing 1]



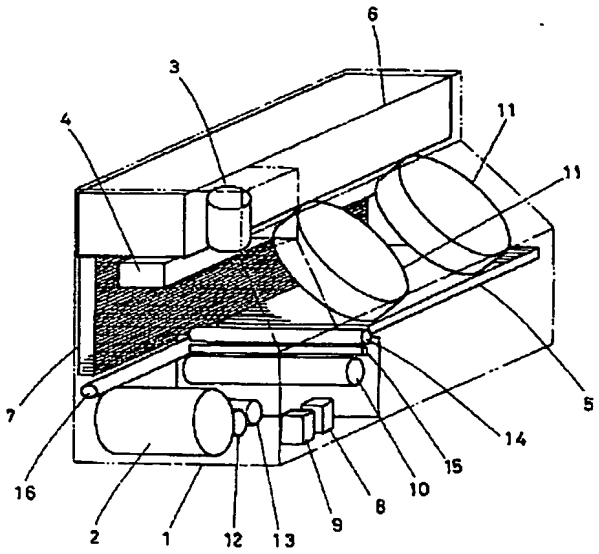
[Drawing 2]



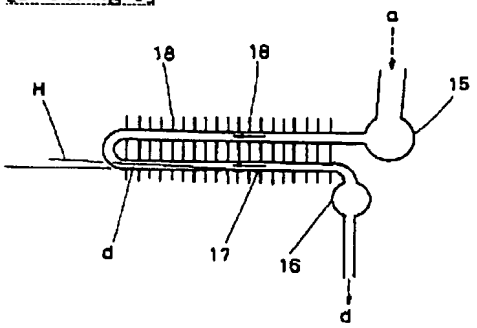
[Drawing 3]



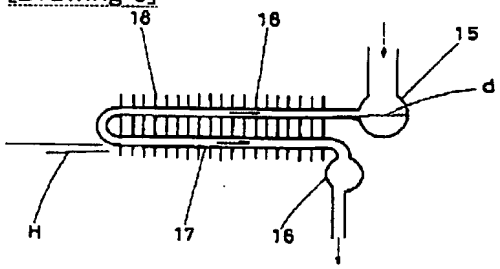
[Drawing 4]



[Drawing 5]



[Drawing 6]



[Translation done.]